Bridging Between Physics Simulation and Interactive Virtual Reality

Workshop Outline

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Overview

This workshop, held at the Center for Interdisciplinary Research (ZiF) in Bielefeld Germany, aims to create a dialogue on the role of physics in interactive simulations. Specific emphasis will be placed on the interplay between the fields of computational physics, computer science, game design and virtual reality (VR) research.

Topics and Motivation

Even the most conceptually simple physical systems are often challenging to implement in real time simulations. While it may be possible to formulate the equations which could provide a quantitative description of a given system's time-evolution, such a realization may be too computationally expensive to be feasible. Nevertheless, there is an increasing demand for (qualitatively and quantitatively accurate) models of physical processes in modern interactive simulations, computer games, and computer generated imagery (CGI).

The ever-expanding field of consumer electronics and computer games opens up new possibilities to explore the connection of physics – and more generally the natural sciences – with realistic visualization. The extreme computing power of next generation consoles (*e.g.* the XBOX 360 and Playstation 3) as well as developments for PC and graphics cards allow for the creation of realistically looking and responding, artificial, interactive worlds.

Within the interdisciplinary environment formed by physics, VR, computer science, visualization, simulation, and computer-related art, new ideas, visions and directions for the future can be realized.

Goals

The primary goals for this workshop are twofold. First, a dialogue between members of various disciplines will be created and fostered. Game engineers can be inspired by potential novel numerical methods and new concepts for implementation in modern *Physics Engines* [1]. Scientists, meanwhile, can benefit from new ideas on interactive visualization and presentation of research results. The second goal within the workshop is an open discussion if these new media can be employed in better or different ways in science education at schools and universities.

Program Outline

The workshop will have several topical sessions. Ample time between session will be available for further discussion. Lecture halls will be equipped with a beamer and sound system for multimedia presentations. The proposed number of invited presentations (approx. 45 min.) will be between 12 and 15. Additional participants are also encouraged. Planned workshop dates are from September 24–25, 2008. The presentations will be published on a website. Tentatively, sessions with the following topics will be held:

- *Computational Physics*
- *Physics Engines in Interactive Simulations and Computer Games*
- *Rendering Artifical Worlds*
- *Physics at the Center of Computer Games*
- *Virtual Reality in Education*
- *Concluding Session*

[1] The Physics Engine contains the algorithms and data structures necessary for the simulation of physical processes in the virtual world